Department of Agriculture, Trade and Consumer Protection
Division of Agricultural Development
Agricultural Development & Diversification Program (ADD)
Grant Project Final Report
Contract Number: **19019**

Grant Project Title: Feasibility Study for Community Owned Manure Digester

Amount of Funding Awarded: $15,000

Name of Principal Contact Person: Mary E. Myers, Cooperative Development Services

Address: 131 West Wilson St., Madison WI 53703

Telephone: 608-244-0118 Fax Number: 608-258-4394

E-Mail Address: memyers@merr.com

WEB Address: www.cdsus.coop

Report Submitted on: June 30, 2005

---

1) What was the original intent of the grant?
   A. What did you want to accomplish with the grant?
   We proposed to conduct a feasibility study on creating a community-owned manure digester system in Dunn County. Manure digester systems are capital intensive and thus are beyond the means of most Wisconsin dairy farms, who have neither the available capital to invest in such a system, nor do their operations produce sufficient quantities of manure to use the system efficiently. We proposed to analyze the feasibility of a *jointly owned* manure digester system that would spread the capital requirements and utilize the manure output of five neighboring dairy farms in Dunn County.

   The analysis was based on the following scenario:
   - The farms purchase the digester systems assets, but Dairyland Power Co-op purchases the generator set and any other assets necessary for generating electricity.
   - The owners of the digester system (the farms) enter into a 30-year biogas contract with Dairyland. Thus the farms are paid for biogas, not electricity.
   - The digester system is constructed by Microgy as a turn-key package for the farmer-owners.
   - Microgy technicians maintain the digester, so dairy producers are not directly involved in day to day maintenance of the system.

   B. How was it expected to benefit Wisconsin Agriculture?
   Manure digester systems have the potential to bring significant economic and environmental benefits to Wisconsin agriculture. If economically viable, a jointly owned manure digester has the potential to:
   - reduce odor, thus mitigating an important social and environmental concern;
   - improve the environment by reducing greenhouse gas emissions;
   - create high-quality fertilizer and animal bedding by utilizing the farm's waste (properly treated, these are both value-added marketable products);
   - produce a valuable new agricultural product – electricity – which may be used on farm or sold to a local utility.

C. What makes this project work important or significant?
If a model can be found that is economically successful and logistically practical, a community owned manure digester could have significant impact on Wisconsin dairy farmers – as well as on their neighbors. The difficulties inherent in transporting manure from the farm on which it is produced to a centrally located digester are obstacles that must be overcome if small to medium sized Wisconsin dairy farms are to continue to be viable.

2) What steps did you take to reach your goal?

The feasibility study covered the following components:

A. Market / Supply Analysis

- Research existing industry literature that evaluates manure digester systems in operation. This analysis will rely on previously conducted research in the public domain.
- Assess the volume of manure inputs among four farms and determine the output production of the proposed manure digester system.
- Analyze the market demand for the estimated system output (including both bio-solids and methane gas) among the interested farmer investors and the larger community. Estimate the sale price of expected bio-solid outputs and the economic value of electrical generation.

B. Technology / Regulatory Analysis

- In consultation with the five farmers, analyze the logistics and technology required for transportation of both inputs and outputs from the chosen site (Dunn Energy Co-op's Elk Mound substation).
- Assess the financial impact of transportation of inputs and outputs on the project.
- Evaluate the regulatory requirements that would affect the project at the chosen site and assess impact of these requirements on the project's capital start-up costs.

C. Legal / Organizational Analysis

- Analyze the advantages and disadvantages of potential organizational structures for the proposed jointly owned business (e.g., cooperative, LLC) and determine which is the most appropriate for this project.
- Ascertain what legal assistance will be necessary to set up the chosen structure.
- In consultation with the five farmers, determine the operational needs of the business and make recommendations on how it will be managed day to day.

D. Financial Analysis

- Identify all start-up costs for the proposed project, incorporating the research discussed above, and develop a capital budget.
- Determine the amount of capital investment available among potential community investors to finance the project and the resulting need for debt capital.
- Estimate the financial performance of the project and expected return on farmer investment by developing 3-year financial projections, including: Sources and Uses (capital budget); Income Statement; Balance Sheet; and Return on Investment Analysis.

3) What were you able to accomplish? What are the results from this project?

Please see attached Final Feasibility Report for a complete treatment of our analysis and conclusions. In summary, the analysis concluded that the proposed jointly owned manure digester would be profitable after year 6, but *only if significant subsidies were available to assist with start-up costs.*

Even so, the return on investment projected in the feasibility report was not sufficient to induce the farmers involved in the project to make the substantial capital investment that would be necessary to participate. In effect, they said: "That's not good enough."

4) What conclusions can you make based on the project and analysis of collected data?

Based on our analysis, it appears that certain characteristics increase the likelihood of success for jointly owned digester systems. A perfect scenario would include:

- At least 2,000 cows to ensure a sufficient amount of manure;
- At least 6 individual farms to ensure that the capital investment is sufficiently spread out;
- Farms should be located within 5 miles of each other to make transportation of manure feasible;
- Farmers should not have made recent investments in manure handling/storage equipment on their farms;
- Subsidies in the form of grants and no- or low-interest loans must be available to assist with start-up costs.

One weakness with our analysis was that it was locked into the Microgy/Dairyland scenario outlined above, which limits its applicability. Future analysis should identify other manufacturers and purchasers of the electricity generated.

5) What do you plan to do in the future as a result of this project? We are currently working on a similar feasibility study using potential sites in Brown and Pepin Counties, to determine whether our analytical model is useful under other scenarios. We would also very much like to explore the potential for piping manure rather than trucking it, to identify the effect on financial feasibility. Although the start-up costs would be higher, it is possible that it would be more cost-effective long term.

6) How should the agricultural industry use the results from your grant project?

We had hoped that a replicable model for community owned manure digesters would be an outcome of this project. Had that been so, interested farmer investors in other areas would have been able to take this feasibility study to the next step of business planning, then implementation.

Although we still believe that jointly owned manure digesters have the potential to create new business activity throughout Wisconsin's dairy industry, additional research will be necessary to develop a model that is truly economically viable, and thus replicable throughout the state. One use of this study so far has been its use in terms of "lessons learned" for a similar effort currently underway in Dane County, Wisconsin. A group of DNR, DATCP, UW, and Dane County officials are currently planning to conduct a feasibility study on a jointly owned manure digester system in western Dane County, to alleviate local concerns with water quality.

Feasibility Report
Jointly Owned Manure Digester in Dunn County, WI

Funded By:
Wisconsin Department of Agriculture
Agricultural Development and Diversification Program
P.O. Box 8911
Madison, WI 53708-8911

and

Wisconsin Focus on Energy
c/o Wisconsin Energy Conservation Corp
211 S. Patterson St., Suite 300
Madison, WI 53703
608-249-9322

Submitted By:
Cooperative Development Services
131 West Wilson Street, Suite 400
Madison, WI 53703
608-258-4396

June 2005

Feasibility Report on
Jointly Owned Manure Digester
in Dunn County, Wisconsin

Table of Contents

Appendices

I Introduction and Background

The purpose of this analysis is to evaluate the overall feasibility of a jointly owned manure digester system in Dunn County, Wisconsin. The proposed digester would be jointly owned by the following four dairy farms, which would form a separate business entity for the purpose of owning and operating the digester system:

a. Christopherson Farms
b. Solberg Farms
c. D & D Hawkins Farm
d. Gilbertson Farms Inc.

In April of 2003 Dairyland Power Cooperative (DPC), the power supplier for Dunn Energy Cooperative (DEC), signed a letter of intent with Microgy, a subsidiary of Environmental Power Corporation and a manufacturer of manure digester systems. The agreement spelled out DPC's intention to generate up to 25 megawatts of renewable energy in the next five years by placing manure digester systems on farms within its service territory. Manure digester systems produce methane gas as a byproduct of the digestion process, which is then used to generate electricity.

Dunn Energy Co-op and other members of DPC's cooperative network were asked to identify suitable dairy farms on which to site the proposed digesters. In its search for suitable farms, Dunn Energy also identified a number of smaller farms that did not have sufficient volume to accommodate a digester system on their own, but were interested in the possibility of sharing a jointly owned digester at a convenient location.

The four farms listed above were identified by Dunn Energy through this process. During the summer and fall of 2003, Jesse Singerhouse of Dunn Energy organized a series of meetings among the four farms (and a few others who did not pursue the idea long term) to discuss preliminary aspects of a jointly owned manure digester. This group identified the Elk Mound substation as a good potential location for the proposed digester, due to its central location and proximity to a Dunn Energy-owned substation. Additional preliminary work included an analysis of each farm's size, manure output, needs, and capacity.

During this investigative period it became clear that additional research would be required on critical economic factors such as transportation costs. In the interim an agreement was reached to install a digester system at Five Star Dairy in Elk Mound prior to pursuing the jointly owned concept.

Input and output estimates used in this analysis were provided by Microgy and were adjusted in June 2005 when actual performance data became available from the digester located at Five Star Dairy.

In the spring of 2004, Cooperative Development Services (CDS) contacted Dunn Energy and indicated an interest in conducting a feasibility study on a jointly owned manure digester. With agreement from the parties, CDS applied to DATCP's Agricultural Development and Diversification program for funding. This grant application was approved in July of 2004. Additional funding was provided by the Focus on Energy program.

Mike Casper of Microgy and Mary Myers of CDS conducted interviews with each of the four farms in September 2004 to identify their needs and interests in the project. These interviews provided critical information for the feasibility study.

Key Assumptions

This analysis is based on the following assumptions:

- The farms would purchase the digester assets, but Dairyland Power Co-op would purchase the generator and other assets necessary for generating electricity.
- The owners of the digester system (the farms) enter into a 30-year biogas contract with Dairyland. Thus the farms are paid for biogas, not electricity.

- The digester system will be constructed by Microgy as a turn-key package for the producer-owners.
- Microgy technicians maintain the digester, so dairy producers are not directly involved in day to day maintenance of the system.

This report outlines the research conducted for the feasibility study. It begins with a discussion of the issues related to the location of the proposed jointly owned manure digester, including costs and logistics of hauling manure to the proposed digester site and permitting issues, in Chapter II. Following that, Chapter III discusses the pros and cons of legal forms for structuring the joint venture. Chapter IV provides a thorough overview of the permitting and regulatory issues related to the proposed project. Chapter V provides a narrative to accompany the financial analysis, including a review of grant and low-interest loan programs that may be available to assist in financing the project.

The report concludes with a short recommendations section which provides suggestions for taking this project to the next step of business planning. The Appendices include additional information, including 30-year financial projections.

The report authors wish to express their thanks to the following individuals who provided their time and expertise for this feasibility study. Mike Casper of Microgy Systems; Jesse Singerhouse, Dunn Energy Cooperative; Jim Faust, Dunn County Agricultural Extension Agent; and Jim McWilliams of Dairyland Power Cooperative; and the dairy producers themselves: Elton and Tony Christopherson; Larry Solberg; Dave Gilbertson; and Dennis and Doug Hawkins.

Cooperative Development Services (CDS) greatly appreciates the contributions made by these and other individuals. However, CDS produced this feasibility report and takes full responsibility for its contents.

Chapter II Location and Transportation Analysis

A. Location

It is proposed that the jointly owned digester be located at DEC's Elk Mound substation just off Highway 29 in Elk Mound in Dunn County. This location is convenient to the four farms and, as noted, is adjacent to an electric substation owned by Dunn Energy Cooperative, which will facilitate distribution of the electricity produced.

The Elk Mound substation, which had been evaluated as a potential location by the parties involved in the preliminary analysis mentioned above, is located on land owned by a relative of Eldon and Tony Christopherson (one of the potential joint owners of the proposed digester). This arrangement should facilitate negotiations for leasing a portion of the property for purposes of constructing a digester.

An alternate location, at the Dairyland substation further east on Hwy 29, was also examined as a potential site. However, the transportation analysis discussed below indicated that this site did not noticeably save transportation costs. The hauling costs were roughly the same, without providing overall advantages to the project.

B. Transportation Analysis

CDS conducted a detailed analysis of transportation costs to determine the impact of these costs on the overall feasibility of the proposed project. Please refer to the Data sheet in the financial analysis spreadsheets as well as to the discussion below.

As part of the round of interviews with the producers conducted in September 2004, CDS obtained information from the farmers about their current costs for hauling manure. In addition, Lee Jensen of Jensen Trucking, who also owns Five Star Dairy, provided information about the market rate for manure hauling. Through these interviews, it was determined that **$1.00 per minute** is an appropriate figure to use for the financial analysis. A quote from another local trucking company was obtained as a cross-check, which confirmed this as a valid rate.

The transportation analysis is based on the following scenario:

- The jointly owned digester corporation contracts with Jensen Trucking to haul manure from each of the farms to the centrally located digester, at a price of $1.00 per minute.
- A Jensen truck starts out at Five Star Dairy, and picks up a full load of manure (6,000 gallons) at each of the following farms, in this order: Gilbertson, Solberg, Hawkins.
- The truck returns to the digester at the Elk Mound substation after each pick-up to deposit manure, backtracking when necessary to finish its rounds.
- Given the manure output of the three farms, the truck must make a minimum of four trips per day and a maximum of five trips per day, 365 days per year.

Note the following assumptions about this transportation scenario:

a. In order to avoid hauling millions of gallons of parlor water, it is assumed that all parlor water is diverted prior to pumping manure at each farm.
b. Because the Elk Mound substation is so close to the Christopherson's Farm, it is assumed that the Christophersons haul their own manure to the digester rather than hire the trucking company to do it.[1]

Using MapQuest via the internet, CDS determined the driving distance and driving time between each farm and the digester, including return trips and backtracking.[2] In addition, actual minutes of pumping time

[1] The Christophersons are the only producers who use lime as part of their bedding material on the farm. There is some question about whether lime will cause a problem in the digester system; however, such a question is beyond the scope of this feasibility study. Microgy engineers must address this issue.

[2] These distances and results were also checked using Terrain Navigator topographical software.

required at each farm were obtained from the dairy producers. Pumping time was increased by 2 minutes per stop to adjust for the fact that parlor water would be diverted prior to pumping.

According to CDS' analysis, each trip requires 90 minutes in optimal weather conditions, including travel and pumping time. Optimal weather conditions are assumed to include the months of May – October, or a total of 184 days per year.

To calculate the additional time needed for inclement weather and cold temperatures, CDS multiplied 90 minutes by the following factors:[3]

- 1.25 for spring and fall months of March, April, November and December (total of 122 days per year).
- 1.5 for winter months of January and February (59 days/year or 60 days in a leap year).

Given these factors, CDS estimates that annual hauling costs would be:

- May – October = $82,800
- March, April, Nov, Dec. = $68,625
- January & February = $39,825

Total = $191,250

The total figure was used in the financial analysis as an annual operating cost for the digester business. Please see Chapter V, Financial Analysis, and the attached spreadsheets for more information.

[3] Note: these multiplication factors were obtained from Eldon and Tony Christopherson, and modified by Lee Jensen, owner of Jensen Trucking.

Chapter III Analysis of Business Structure

This chapter of the feasibility report analyzes the options available for structuring a jointly owned manure digester, and describes the pros and cons of each option. The two primary options available are the cooperative and the LLC. This chapter examines each of these two models separately and concludes with a recommendation.

This analysis assumes that the chosen business model should:

a. Provide a relatively simple and low maintenance legal structure that facilitates business operation but does not require undue time and effort on the part of the owners;
b. Provide a mechanism to raise sufficient funds to properly capitalize the venture;
c. Provide a mechanism for return on investment that maximizes ownership benefits for the producers.

Ownership of Assets

As noted in the Introduction to this report, the four farms involved in this project would own only the digester and related assets, while Dairyland Power Cooperative (DPC) would own the gas line leading from the digester to the electric generator and the generator itself. This agreement allows DPC to own all assets related to generation of electricity while the jointly owned digester system sells only biogas to DPC.

Cooperatives

By definition, a cooperative belongs to the people who use it — people who have formed a business to provide goods and services they need. Cooperatives enable the farmer members to own and control the business and to operate it for their own benefit. They have been used in rural areas as a mechanism for farmers to solve economic problems and to improve social conditions.

A unique characteristic of cooperatives is that each member's financial return is based on their usage of the co-op rather than their original investment in it. In addition to making the co-op more accessible to those without the means for large financial investments, this mechanism provides an incentive for members to use the co-op as much as possible.

Note also that cooperatives are subject to single taxation. A cooperative can exclude from its taxable income any business profits that are refunded to members as patronage dividends. Thus the co-op pays no federal income tax on any profits that are refunded or allocated to members.

On the other hand, the cooperative is not a good investment vehicle. Because the return on investment by non-member investors is limited to 8%, cooperatives traditionally have not provided attractive investment opportunities for those who do not use it directly. Thus cooperatives seldom attract outside equity, limiting their ability to grow.

To address this problem, in recent years a form of cooperative, called "new generation cooperatives" has emerged. To remain viable in the market place, cooperatives must provide economic benefits to members equal to or greater than those offered by other types of business structures.

New generation cooperatives offer a way to retain the three most important characteristics of co-ops - democratic control by members, return of earnings to members on a patronage basis, and subordination of capital - while at the same time improving the appeal and return on investment to outside investors.

New Generation Cooperatives differ from agricultural marketing co-ops in that their focus is on "value-added" products, rather than commodities. NGC members sell their products to their cooperatively-owned processing plant. Profits from this operation are distributed to members *in proportion to* raw product delivered.

The primary characteristics of new generation cooperatives are as follows:

Membership. The coop's owner/members are divided into two classes: Class A shares are patron or voting shares. Class A shares in an NGC do not simply assign membership as they would in a traditional co-op. Rather, they allocate delivery rights. Each share in a new generation co-op entitles the member to deliver one unit of raw product to the cooperatively owned processing plant.

This represents what is known as a "dual contract" - the farmer must deliver a unit for each share purchased, and the cooperative must accept and compensate the farmer for each unit delivered.

Class B members are sometimes called non-patron members. Non-patrons do not have delivery obligations and are essentially investors (although Class A shareholders may also participate as investors).

Financial Returns. Class A members are allocated profits, losses, and distributions based on their patronage of the cooperative. Class B members are allocated financial returns based on their financial contribution.

Generally, NGC's return all or most of the profits each year to members, keeping only a small portion as capital retains. When an NGC needs to finance an expansion, it acquires capital through a new offering of additional shares rather than from the previous year's profits but, in this way, the added-value that the cooperative captures is returned to members each year.

Federal Tax Treatment. New Generation Co-ops can be treated as partnerships and LLC's for Federal income tax purposes. In other words, they can avoid tax at the corporate level. This creates a mechanism for outside investment while still preserving patronage and democratic control.

There are several advantages to the New Generation Co-op structure:

- Adequate equity capital is raised at the start of the business.
- The responsibility for capitalization is distributed among the members in proportion to the future use each member will make of the cooperative.
- Because each member is financially invested in the business, each has a vested interest in its success.
- Upon exiting the co-op, a member may redeem his invested equity immediately - at a value that reflects the performance of the cooperative – by selling his or her co-op shares.

The beauty of the NGC model is that, despite its differences from traditional cooperatives, it retains the most highly-valued cooperative principles. Most importantly, NGCs are democratically-controlled businesses. Regardless of the number of shares a member may own, every member receives one vote only. Members elect a board of directors from among themselves to oversee the organization.

Limited Liability Company (LLC)

The other primary organizational structure choice for the jointly owned manure digester would be a limited liability company (LLC). The essential advantage of the LLC is that it combines the single-tax advantage of a partnership or cooperative with the limited liability of a corporation.

LLC's are flexible vehicles that can be structured to allow both patronage and non-patronage income to pass through to the members. Thus they allow a great deal of freedom in structuring financial relationships with members and other investors. In fact, LLC's could be formed with one or more cooperative features, and there could be a wide variety of cooperative-type entities formed under the LLC statutes.

An LLC is not considered separate from its owners for tax purposes. Instead, it is what the IRS calls a "pass-through entity," like a partnership or sole proprietorship. Thus, business income passes through the business to each LLC member, who reports his share of profits -- or losses -- on his or her individual income tax return. The LLC itself does not pay federal income taxes.
Each LLC member's share of profits and losses, called a distributive share, is specified in the LLC Operating Agreement. Most operating agreements provide that each member's distributive share will be in proportion to

his or her percentage of ownership of the business. For example, if John owns 75% of the LLC, and Linda owns the other 25%, then 75% of the LLC's profits and losses will go to John, and 25% will go to Linda.

Note that IRS treats each LLC member as though she receives her entire distributive share each year, regardless of whether she actually does or not. Thus even if LLC members need to leave profits in the LLC in order to expand the business, each LLC member must pay income tax on his or her share of those profits.

LLC Management

Most small LLC's are managed equally by the owners of the business. This is called "member management." The alternative management structure is to designate one or more owners (or a non-owner) to manage the LLC. In this case the non-managing owners are not involved in day to day management, but share in the LLC's profits. However, only the designated managers can vote on management decisions and act as agents of the LLC. In addition, this choice of management structure can complicate securities issues.

The table below provides a summary of the primary differences and similarities between LLC's and Cooperatives.

Comparison of LLC and Cooperative Forms of Business[4]

Characteristic	LLC	Cooperative
Voting Rights	One vote per share owned	One vote per member
Single Taxation	Yes	Yes
Personal Liability	Limited	Limited
Distribution of Profits	Based on shares owned	Based on co-op patronage
Limitation on Profits	None	Limit of 8% of investment
Transfer of Interest	Per Operating Agreement	By Consent of Board

Summary of Organizational Options

Given the pros and cons outlined above, CDS recommends that the four farms involved in this project form an LLC rather than a cooperative. This form allows owner-investors to structure the business in ways that preserve traditional cooperative values if they so desire, while safeguarding additional flexibility that a cooperative may not provide.

Note that the three primary characteristics of the "new generation" cooperative (equity investment, commitment on the part of the producer to provide goods to the co-op and on the part of the co-op to provide processing services to the producer) can be built into the structure of the LLC if they are desired.

In addition, the LLC form provides additional flexibility if there is a need for outside investors to capitalize the project. As noted above, federal law limits return on investment in cooperatives to 8%. No such limitations exist with LLC's.

[4] Adapted from, Roger B. Brown and Christopher D. Merrett. "The LLC vs. the New Generation Cooperative: Alternative Business Forms for Rural Economic Development." Rural Research Report, IL Institute for Rural Affairs. Spring 2000.

IV Permitting and Regulatory Analysis

This section of the report provides a detailed discussion of the regulatory and permitting requirements for the proposed digester. The discussion covers township regulations first, followed by county, then state regulations. It concludes with information about permits required for utilizing digested products.

A. Township Permits and Approvals[5]

1. Building Permit

In Dunn County this is handled at the Township level. The owner of the manure digestion facility will have to apply to the Town of Elk Mound for a Building Permit.

Procedure and Costs:
$100 application fee. Building permit granted by Vern Hansen, Town Chairman. Because of the need to comply with state Uniform Dwelling Code requirements, the Town may enlist the aid of a building inspector in 2005, but this is unclear. In any case, approval, according to Hansen, should be pretty easy.

Contacts:
Vern Hansen, Town of Elk Mound Chairman, (715-879-5242).

2. Road Weight Limits

These are in effect in Elk Mound Township for spring season, but, according to the Town Chairman have been waived for the Five Star project.

Contacts:
Vern Hansen, Town of Elk Mound Chairman, (715-879-5242).

B. County Permits and Approvals

1. Manure Storage Ordinance

The purpose of the Ordinance is to regulate the location, design, construction and operation of new or altered manure facilities and the application of manure from those facilities. Dunn County's Ordinance references National Resource Conservation Service (NRCS) Technical Guide Standards 313 for Waste Storage Facilities, 590 for Nutrient Management and 6234 for Waste Transfer.

Typical items addressed are distance from a well, groundwater and bedrock, the type of liner needed, if any, and where the manure will be spread. Application must be made to the Dunn County Land Conservation Division before construction is started.

Any operation with an approved manure storage facility is also required to develop a Nutrient Management Plan. Any new structure must meet NRCS design standards ('313' standards). Many metal tank structures are pre-approved under NRCS guidelines

Dunn County had questions about the solids separator at the Five Star Dairy but it was determined that, since the manure is inert at this point and shouldn't be classified as manure waste, a separate permit was not needed.

Procedure and Cost:
The applicant needs to submit a plan package with information in accordance with the referenced NRCS standards, which includes topographical information on location, with soil borings, and a nutrient management plan to the Dunn County Land Conservation Office. The package must be signed and stamped by the project engineer. Once that is submitted approval should only take a few days. There is currently no fee, although this

[5] There is currently no zoning enforcement in Elk Mound Township.

could possibly change in the future. No manure can be placed in a facility unless the Division has issued a Final Certification.

Contact:
Bob Kainer, Dunn County Land Conservation – (715-232-1496)

2. Nutrient Management Plan
Dunn County's Manure Storage Ordinance requires as a condition of approval of a new storage structure that a Nutrient Management Plan (NMP) be on file. In addition, all farms that land-spread manure from a digester are required to have an NMP. Although ostensibly a requirement of state law, the system is basically self-enforcing.

A Nutrient Management Plan (NMP) balances the needs of a crop with the nutrients available from legumes, manure and fertilizer. It is a written plan developed in accordance with NRCS 590 standards and must be updated annually. A Nutrient Management Plan is a component of a Comprehensive Nutrient Management Plan (CNMP),

CNMPs are conservation plans unique to livestock operations. These plans document practices and strategies adopted by livestock operations to address natural resource concerns related to soil erosion, livestock manure and disposal of organic by-products. The development of a CNMP begins with a comprehensive engineering and conservation planning resource assessment of current site conditions. Management options and structural alternatives are developed to address resource concerns identified during the assessment.

The NMP details the utilization of the animal waste, including the amount of land available for application of waste, identification of the areas where the waste will be used, soil types and any limitations on waste application due to soil limitations, type and proximity of bedrock or water table, slope of land, and proximity to surface water. All fields receiving animal waste must be at or below the tolerable soil loss "T" for that field.

Procedure and Costs:
Development of an NMP can be expected to cost in the range of $7 or $8 an acre and updates in the range of $3 or $4 an acre which may be necessary on a yearly basis or not. NMPs require soil test borings, which can take 3 to 6 months to complete and be analyzed and have been the biggest time factor. NMPs can be certified by NRCS or through a certified consultant listed on the NRCS TechReg website.

Contact:
Bob Kainer, Dunn County Land Conservation – (715-232-1496)
Dale Gagner, NRCS, 715-2614, ext. 101

3. Sanitary Permit
Will only be required if there is a need for employee restrooms on-site, which doesn't seem likely.

C. State Agency Permits and Approvals

1. Wisconsin Pollutant Discharge Elimination System (WPDES) permit
These permits are required for animal operations of 1,000 animal units or more or CAFOs (Concentrated Animal Feeding Operations). A WPDES permit would not be applicable to a community collection and digestion facility if it is located where there is no animal concentration of that size or it is located on the site of an existing operation that is already permitted and that has no expansion plans. However, there is some ambiguity since some of

the WPDES requirements linked to spreading of co-mixed waste may apply, in the opinion of DNR staff (see below).

2. Stormwater Construction Site General Permit
A permit is not required if less than one acre (210'x 210') of land will be disturbed.

If more than one acre is disturbed, then a Stormwater construction permit is required as well as an Operation Stormwater permit, which requires Best Management Practices and erosion control and Stormwater management plans. Requirements are minimal if the operation is judged to be a Tier 3 facility. A Tier 3 facility has no exposure of storm water runoff to raw materials, intermediate materials or waste. Facilities must certify to DNR that they have no discharges of contaminated stormwater and that DNR has concurred. Tier 3 facilities still require identification and elimination of non-permitted outfalls, good housekeeping and annual compliance inspections. There is no permit fee.

Procedure and Costs:
If a construction permit is required, a Notice of Intent must be filed with the DNR at least 14 days before construction commences. For projects under 5 acres, the fee is $140. Upon completion of construction and stabilization of the disturbed area, a notice of termination must be filed.

Contacts:
Jim Devlin, DNR Stormwater Specialist, (715-684-2914)

3. Air Quality Permits (for generator)
In the business structure model being used by DPC and Microgy, the generator and responsibility for its permitting will be owned by DPC. However, understanding the permitting process and potential restrictions is necessary for project planning and for development of other business models.

Dunn County is in an attainment area for all air pollutants, which means that regulations on emissions are less stringent. An Internal Combustion generator or generators attached to a community digester will emit pollutants of concern including Volatile Organic Compounds (VOCs), Particulate Matter (PM), Nitrogen Oxides (NOx) and Carbon Monoxide (CO). Exemptions from air permitting can be granted based on the calculated total emissions and emission rates. For VOCs, PM and NOx emission rates cannot exceed 5.7 lbs./hr. and for CO it cannot exceed 9 lbs./hr. Calculations are based on emission factors for gas-fired IC engines that are developed and published by the EPA. The EPA guidance determines emissions on a lbs. per MMBtu fuel heating value input.

The Five Star Dairy project has calculated emissions and received an exemption from the DNR. According to Mike Casper, emissions calculated were approximately half the regulatory threshold. Dairyland Power is planning voluntary emissions monitoring at Five Star to provide a deeper knowledge and basis for exemptions for future projects.

Whether a community project will be eligible for an exemption would be questionable. Since the herd size contributing manure to a community digester would be in the range of 2,000 cows it would require about twice the generating capacity of the 1,000 cow Five Star project which feeds a 750 kW unit. Twice the emissions might push the regulatory threshold.

General exemptions for construction permits are granted under NR 406 rules. Even if an exception for a construction permit is granted, the facility may still need an Operating permit (granted under NR 407 rules) which will define operating parameters, emissions and monitoring, if applicable. A Construction permit must either be granted, or an exception granted, before any construction or site preparation can begin.

Process and Costs:
Determination of an exemption would take at most a month. DNR will take emissions calculations generally on faith as long as they can be documented, for purpose of an exemption. If the facility is not exempted, the process for being granted a Construction permit would be expected to take around 3 or 4 months and to cost about $4,000. If an exemption is granted there is no fee. There is no cost for an Operating permit.

Contacts:
Steve Dunn (WDNR Bureau of Air Management), 608-267-0566

D. Permits Required for Digested Product Utilization

1. Monitoring and reporting for co-digested waste stream
Because the Microgy thermophyllic digestion systems co-mixes a high-fat source with the manure before digestion, the source and purity of this co-mixed waste may come under regulatory scrutiny. The concern is that through land spreading or other applications contaminants might enter the food stream or the environment. The source of fat for the Five Star project is currently being landspread.

As part of the requirements for a Water Pollution Discharge Permit Concentrated (WPDES), Animal Feeding Operations (CAFOs) are regulated in terms of the types of materials that can be used for landspreading. The Five Star Dairy is a CAFO (with 1,000 animal units or more). The applicability of these regulations to a community digester project, which is not located at the site of a CAFO, is not clear, although Duane Popple of the DNR staff thinks they would apply. Nor is it clear if such an operation would thereby need a WPDES.

Under the WPDES requirements there are regulations about the amount of non-manure that can be mixed –less than 10% of the total amount digested can be non-manure for the digested product to be classified under the animal waste landspreading regulations (NR 243). If 10% or more is non-manure, then the digested product is classified under the industrial product landspreading regulations (NR 114) with stricter requirements and restrictions. The NMP for Five Star specifies monitoring this waste before and after processing and Microgy will be voluntarily performing even more stringent monitoring to provide documentation for future projects.

Contact:
Duane Popple, WDNR Agricultural Runoff Specialist, 715-839-3758

2. NR 243 Revisions
Wisconsin is in the process of revising its Agricultural Runoff rules – NR 243. The proposed revisions, which are expected to be enacted in 2005, include requirements for:

- 6 months of storage of liquid manure,
- No surface application of liquid manure on frozen or snow-covered ground
- Surface application of solid manure on frozen ground under guidelines
- NMPs to include consideration of Phosphorus for CAFOs

The impact of these revisions on a community digester project is not entirely clear at this time.

Contact:
Sue Porter, DATCP, (608-224-4605)

3. Fertilizer Dealer License
A license is required to distribute, manufacture or sell fertilizer products in Wisconsin; this would apply to digested manure landspread or sold by the proposed digester facility. The permit is $50 per year and applies from August 15th through August 14th of the following year.

Currently regulations also require payment of $1.48/ton for fertilizer products distributed or sold (including landspreading), but as part of regulation reform currently proceeding, DNR and DATCP are proposing that digested manure be redefined as manipulated manure, rather than fertilizer and be specifically excluded from this requirement as long as the manure goes to a field with a Manure Management Plan. The $50 fee is still likely to be required.

Contact:
DATCP Bureau of Agrichemical Management (608-224-4537.

Fertilizer Permit to Distribute Non-Agricultural or Special Use Fertilizer
A fee of $25 per product is required.

Contact:
DATCP Bureau of Agrichemical Management (608-224-4537.

NOTE: In the financial analysis conducted for this feasibility study, the following is assumed:

- that all permits related to building and construction of the digester are the responsibility of Microgy;
- that all permits related to the generator are the responsibility of DPC;
- that all permits related to distribution of digested products are the responsibility of the LLC or the individual farms; and
- that all farms considering involvement in this project have an NMP on file.

V Financial Analysis

This section of the report provides a discussion of the financial analysis conducted for this feasibility study. It begins with a review of the grants and low- or no-interest loans that might be available to assist in financing the proposed digester, and concludes with a line by line discussion of the financial analysis spreadsheets in Appendix A.

A. Financing Options

It may be possible to access grant and/or low- or no-interest funds from federal and state programs designed to support new concepts in bioenergy utilization and new rural business ventures. CDS conducted research into these programs a the results are discussed below.

Grants

This section reviews potentially applicable sections of the federal farm bill and other federal programs, as well as one grant program offered by the state of Wisconsin.

1. Section 9006

Qualified Projects:

Wind turbines, anaerobic digesters, solar hot water, solar photovoltaics, geothermal heating/cooling. All projects must use pre-commercial or commercially-available equipment (No R&D).

Ineligible Projects:

Land acquisition; biomass production, processing or transportation of RE projects.

Eligible Expenses:

- Pre-development expenses (energy audits, feasibility studies, business plans, permitting fees and professional services other than application preparation)
- The purchase and installation of equipment and facilities.
- Grants cannot be used for planning and feasibility studies alone.
- Grants cannot be used for agricultural tillage equipment, vehicles or new buildings except where the building is replacing one of similar size and purpose.

Eligibility Requirements:

- Farms, livestock operations and "rural small businesses"
- Must own and control the operation of proposed project
- Must show "demonstrated financial need"

Minimum/Maximum Grant Amount:

- $2,500-$500,000 for renewable energy systems
- Grants can cover up to 25% of total project costs

Matching Funds Requirements:

- 75% matching funds may not include other federal grants
- 3rd-party in-kind contributions can be applied towards the match (up to 10% of the 75% match or 7.5% of total project costs
- Matching funds must be secured prior to submitting an application and must be spent prior to receiving the grant award.
- Federal funds paid out only after 75% match is exhausted. 10% holdback until the system is operational

Application Process:

- Deadline for next round most likely in July, 2005
- Feasibility Study required for Applications Over $50,000

Available Funds 2005: $23 million.

Contacts:

Mark Brodziski, USDA RD
4949 Kirschling Court
Stevens Point, WI 54481
(715) 345-7615, Ext. 131
(715) 345-7616 fax
mark.brodziski@wi.usda.gov

2. Section 6401 (Value Added Producer Grants)

Qualified Projects: Value-added agricultural products and farm-based renewable energy.

Eligible Expenses:

- Planning activities (Business planning and feasibility)
- Working capital

Eligibility Requirements:

This program is open to independent producers, agricultural producer groups, farmer or rancher cooperatives, and majority-controlled producer-based business ventures.

Maximum Grant Amount: $500,000

Available Funds 2005: $15.5 million

Matching Funds Requirements: 50%, from applicant or third party

Application Process:

- Expected application deadline July 2005
- Expected grant announcement deadline October

Contacts and Information Sources:

Barbara Brewster
USDA Rural Development
4949 Kirschling Ct.
Stevens Point, WI 54481
Phone: (715) 345-7610
barbara.brewster@wi.usda.gov
http://www.rurdev.usda.gov/rbs/coops/vadg.htm.

3. Biomass Research and Development Initiative (USDA)

Qualified Projects:

Biomass Research, Development and Demonstration projects in biobased products, fuels and energy. USDA yearly defines particular technical topic areas. Technical Topic Areas for 2005 are:

- Feedstock Development and Production
- Biobased Product Development Economic and Environmental Performance
- Integrated Resource Management and Biomass Use
- Incentive Analysis for Commercialization

It is not clear if a Community Digester project would be eligible under these topic areas, but the area of seeming most relevance would be the first – Feedstock Development and Production Methods. Under this topic projects are sought that research "methods and costs of collection, handling, processing, and transportation of crops that promote economic viability of their use as biomass feedstocks."

Eligible Expenses: Not entirely clear, but apparently both capital (construction) costs and operating (personnel) are eligible.

Eligibility Requirements:

- Private sector entities, institutions of higher education, nonprofit organizations, national labs, federal and state research agencies and consortia of one or more of the above entities. Consortia are encouraged.

Minimum/Maximum Grant Amount: $200,000 to $2 million

Matching Funds Requirements: 20%

Available Funds 2005:

Application Process: Pre-application due February 15, 2005 (3 page description); full application due April 15, 2005. Criteria include technical relevance and merit, energy displacement, rural economic development potential, environmental benefits and technical management capabilities.

Contacts and Information Sources:

USDA-NRCS, Management Services Division, P.O. Box 2890, Washington DC 20013-2890, Attn: Sheila Leonard. http://www.bioproucts-bioenergy.org

4. Conservation Innovation Grants (CIG) - Natural Resource Conservation Service

Competitive grants to carry out projects that "stimulate innovative approaches to leveraging federal investment in environmental enhancement and protection in conjunction with agricultural production." CIG is intended to benefit agricultural producers by providing more options for environmental enhancement and compliance with

regulations and to assist in accelerating technology transfer and adoption of promising technologies.
Qualified Projects: The proposed innovative project must encompass the development, field testing, evaluation, and implementation of promising conservation technologies, practices, systems, procedures, or approaches. To be given priority consideration, it must:

- Demonstrate, test, evaluate or verify environmental effectiveness and utility;
- Adapt conservation technology or management to improve performance.

Eligibility Requirements: Any recognized tribe, governmental or non-governmental entity, or individual may apply.
Maximum Grant Amount: Grants may cover up to 50 percent of the total project cost but no more than $1 million per project.
Matching Funds Requirements: Nonfederal matching funds for 50% of the project cost.
Available Funds 2005: $15 million
Application Process: Applications due Monday March 28, 2005
Contacts and Information Sources:

Patricia Leavenworth
8030 Excelsior Drive, Suite 200
Madison, WI 53717
608-662-4422 pat.leavenworth@wi.usda.gov

5. Value Chain Development Pilot Grant Program (Part of Grow Wisconsin)

Qualified Projects: Dairy businesses that are introducing new dairy products or entering new markets and who demonstrate that the new product or market has potential for increased profitability.
Eligible Expenses: Grant funds may be used for working capital, marketing expenses and professional services necessary to implement the project, and assets other than real estate that are vital to the success of the project for which other funds are not available. Expenses incurred before funding is approved are not eligible for grant funding.
Minimum/Maximum Grant Amount: Grants up to $50,000
Matching Funds Requirements: The applicant must demonstrate that it will contribute not less then 25% of the cost of the proposed project. Matching resources may be in-kind.
Application Process: Applications may be submitted to DATCP at any time. The department will review applications in the order received. Grants will be awarded until program funds are exhausted.
Contacts and Information Sources: http://www.growwisconsindairy.org

Low- or No-Interest Loans

1. **RedLeg** (Rural Economic Development Loans & Grants) is a financing program that channels federal loans and grants through rural electric and telephone co-ops to economic development projects. The program provides USDA loans and grants to Rural Utilities Service (RUS) borrowers who are willing to act as a pass-through to make these funds available to economic development projects in their area.

   Although the application process is somewhat difficult, Wisconsin REC's have a good track record in receiving RedLeg funds. No interest loans for up to $400,000 can be obtained, although there can be a long lag time between application and approval.

2. The **Electric Program of RUS** also makes loans and loan guarantees to finance the construction of electric distribution, transmission and generation facilities, including on-grid and off-grid renewable energy systems.

   RUS makes loans to corporations, states, and agencies such as municipalities, people's utility districts, and cooperative, nonprofit, organizations that provide retail electric service needs to rural areas or supply the power needs of distribution borrowers in rural areas. The borrower would be Dunn Energy Cooperative (or, possibly DPC), which would loan the money to the joint entity owned by the four farms.

   The best program for this project would be USDA Electric Service's Treasury Rate Loan, which finances construction of renewable generation facilities, among other facilities. The eligible borrower would be a retail provider or a power supply provider for renewable generation facilities.

   The interest rate is set daily by the U.S. Treasury and is subject to change. Loan payments are amortized over

30 years but the loan matures with a balloon payment at the end of the loan period (in this case 10 years).

B. Narrative to Financial Spreadsheets
This section of Chapter V provides a line-by-line narrative to accompany the financial spreadsheets in Appendix A.[6]

The financial analysis includes the following, projected out 30 years:

- Sources and Uses of Funds (capital budget)
- Income Statement
- Balance Sheet
- Return on Investment Analysis
- Cash Flow Statement
- Loan Amortization Schedule (for 10-year life of loan)

The discussion below identifies the major elements of the Sources & Uses, Income Statement, Balance Sheet, and Retu on Investment Analysis. Lastly, a summary of the financial analysis highlights the major findings. *The expenses discussed below are estimates only and should not be construed as firm quotes*.

Sources and Uses of Funds (Capital Budget)
All start-up capital costs are identified in the Sources and Uses of Funds statement. The discussion below identifies the source of each estimate. Note that in general, conservative assumptions were used to estimate costs.

Uses of Funds
The following capital equipment would be necessary to start up the proposed digester system. Note that all prices are estimates from Microgy Systems, Inc.

Holding Tank for Raw Manure	$75,000
Digester System (800,000 gallon tank)	$1,500,000
Post-Digesting Lagoon (180 day storage)	$250,000
Separator	$55,000
Building to house separator	$70,000
Total	$1.95 million

Additional start-up costs would include: sales tax on capital equipment (5%), legal assistance to set up the LLC (estimated at $20,000), and working capital (estimated at $50,000).

Uses of Funds
Total uses of funds (capital costs) are estimated to be $2,117,500.

Sources of Funds
There are four sources of funds:

1. The four producer/members of the LLC, who together supply 30% of the total capital needed, or $635,250 ($158,813 each if divided equally).
2. Grant funds from the 9006 and 6401 grant programs (see discussion above), which supply $1 million of the total capital needed. These grant programs limit awards to $500,000 each, and require matching funds.
3. RedLeg loan (see above), which supplies $400,000 (the maximum allowed under this program). This is a 0% interest loan amortized over a term of ten years.
4. A commercial loan obtained on the market, which supplies the remaining funds needed, or $82,250. This is a 10-year loan at 6% interest.

[6] Note that the federal production tax credit (PTC) is not factored into the financial analysis. This is because the law requires that the legal entity that receives the federal tax credit resulting from electricity production must also receive the revenue from the sale of that electricity. As a result, the farmers who own the digester cannot take advantage of the PTC because they will not be generating electricity.

Sources of Funds equal Uses of Funds at $2,117,500.

Income Statement
This section of the financial analysis describes the revenue and operating expenses of the proposed digester. The analysis shows annual results for 30 years.

Revenue
The proposed digester system has three sources of revenue:

1. Sales of biogas to Dairyland. Using production data from Microgy, CDS estimated the annual biogas output of the digester system and multiplied it by the sales price to Dairyland per million Btus. An inflation factor of 1% per year is built into the analysis so that revenue rises slightly over time. Please see the spreadsheet called "Data" for additional details.
2. Sales of digested solids for bedding, which is estimated to bring in over $76,000 in the first year of operations. An inflation factor of 1% is built into the analysis. Please see the spreadsheet called "Data" for additional details.
3. Sales of waste heat. This opportunity has not been thoroughly researched for this feasibility report, but it is possible that a buyer could be found to purchase the waste heat generated by the digester system. It is estimated that sales of waste heat could generate nearly $75,000 in revenue in the first year of operations. An inflation factor of 1% is built into the estimates. Please see the spreadsheet called "Data" for more details.

These three sources of revenue result in sales of $349,279 the first year of operations.

Expenses
All expense estimates are based on research with Microgy, other vendors, and existing manure digester systems (although data is often difficult to obtain from private owners).

Operating Expenses include:

1. Transportation of manure to site: CDS charted the exact location of each farm and the proposed jointly owned manure digester in order to calculate how many miles the hauling truck must travel for daily manure pick-ups. Using information from the producers, CDS made an estimate of how many minutes must be spent at each farm for pumping in addition to travel miles between farms. This information was used to calculate hauling costs, using the rate of $1 per minute for hauling during optimal weather (May-Oct, or 184 days/year). This rate has been confirmed by two companies involved in hauling manure in western Wisconsin, as well as discussions with UW-Extension.

   In order to estimate the impact that bad weather has on hauling costs, CDS multiplied the cost of hauling during optimal weather by 1.5 during January & February (total of 59 days in non-leap years) and 1.25 during March & April and November & December (total of 122 days per year). This estimate was suggested by the Christophersons, and modified by Lee Jensen. Please see the spreadsheet called "Data" for additional details.

The remaining operating costs were estimated by Microgy. Efforts to obtain other estimates to in order to confirm these numbers met with limited success because digester systems are not very comparable.

- Operations & Management: Estimated by Microgy at $35,000 per year.
- Electrical Usage: Estimated by Microgy at $15,000 per year.
- Land Lease: $5,000 per year.
- Insurance: $10,000 per year.
- Maintenance: $25,000 per year.

All operating expenses are calculated to rise at 1% per year.

Operating Profit (Loss) before Interest/Depreciation: The operation shows an operating profit in its first year before depreciation.

Depreciation: Please see discussion below under Balance Sheet for explanation of depreciation.

Interest Expense: There is no interest charged on a RedLeg loan, but the interest expense on the 6% commercial loan is shown here.

Net Income (Loss) after Interest & Depreciation: The operation shows a net loss during the period of depreciation (6 years). After being fully depreciated, it shows a net profit starting in year 7.

Balance Sheet
This document presents a summary of the assets, liabilities, and equity of the proposed jointly owned digester.

Current Assets:

- Cash: The operation starts out with cash from working capital as noted in the Sources and Uses statement. The cash on hand adjusts each year to reflect net income or loss of the operation.

Fixed Assets:

- Capital Equipment: Starting value is the total capital costs of the digester, holding tank, lagoon, separator, and building.

- Less Accumulated Depreciation: The capital equipment is depreciated at an accelerated rate, shown here using a five & ½ year MACRS schedule. Organizational assets, including the legal costs, are depreciated over two years by the straight-line method.

Current Liabilities:

- Accounts Payable/Accrued Expenses: This is equal to one month's operating expenses (minus transportation costs).
- Current Portion of LT debt: This line shows the annual principle payment on the 10-year RedLeg loan.

Long Term Liabilities:

- Note Payable: This reflects the remaining portion of the RedLeg loan, payable annually.

Owner's Equity: this is the financial contribution made by the owners.

Retained Earnings is equal to the accumulated net profit in each year of operation.

Return on Investment Analysis
This spreadsheet shows a simplified version of the estimated return on investment for each LLC share. It shows the return that each LLC share would receive, given the financial performance that this analysis projects. At the top is the total capital investment required by the LLC ($635,250). If this were split equally among the four farms, each one would be required to invest $158,813.

Due in part to the accelerated depreciation schedule, the digester system shows a net loss during its first six years of operation. Thus, the LLC owners receive a negative return on their investment during that period of time. Starting in year 7, the operation shows a net profit every year, and the return per share is shown as the profits slowly rise during the 30-year life of the digester. Averages for each 10-year period are shown as well.

Summary of Financial Analysis

The business model developed for this report proposes that the four dairy farms create an LLC which will own and operate the manure digester. The table below provides a summary of the operation's projected net profit or loss and each LLC owner's share of profit/loss in selected years, assuming the profits and losses are divided equally among the four LLC owners.

	Net Profit/Loss	LLC Share
Year 5	-$154,941	-$39,235
Year 10	$74,054	$18,513
Year 15	$78,202	$19,551
Year 20	$82,196	$20,549
Year 25	$86,388	$21,597
Year 30	$90,795	$22,699

The financial analysis developed for this feasibility report indicates that the project requires subsidies (in the form of grants and no-interest loan) to make it financially feasible. Maximum funds from both the 9066 and the 6401 grant programs and the no-interest RedLeg loan program are used to provide $1.4 million of the capital needed for start-up. Although there are numerous financing scenarios that could be created, it is clear that with only four farms investing in the project, such assistance is needed to acquire the necessary capital.

This is not to say that the project would not be feasible under other conditions. Additional analysis can be conducted that experiments with different combinations of debt/ equity/ grant financing.